



STATE OF WASHINGTON  
**STATE BUILDING CODE COUNCIL**

May 2018  
Log No. \_\_\_\_\_

**1. State Building Code to be Amended:**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> International Building Code | <input type="checkbox"/> International Mechanical Code        |
| <input type="checkbox"/> ICC ANSI A117.1 Accessibility Code     | <input type="checkbox"/> International Fuel Gas Code          |
| <input type="checkbox"/> International Existing Building Code   | <input type="checkbox"/> NFPA 54 National Fuel Gas Code       |
| <input type="checkbox"/> International Residential Code         | <input type="checkbox"/> NFPA 58 Liquefied Petroleum Gas Code |
| <input type="checkbox"/> International Fire Code                | <input type="checkbox"/> Wildland Urban Interface Code        |
| <input type="checkbox"/> Uniform Plumbing Code                  |   |

For the Washington State Energy Code, please see specialized [energy code forms](#)

**Section(s): 1615**

**Title: Tsunami Loads**

**2. Proponent Name (Specific local government, organization or individual):**

**Proponent: Individual**

**Title:**

**Date: April 7, 2022 (revision 1 – October 14, 2022)**

**3. Designated Contact Person:**

**Name: Cale Ash**

**Title: Principal**

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4. **Proposed Code Amendment.** Reproduce the section to be amended by underlining all added language, striking through all deleted language. Insert new sections in the appropriate place in the code in order to continue the established numbering system of the code. If more than one section is proposed for amendment or more than one page is needed for reproducing the affected section of the code, additional pages may be attached.

Clearly state if the proposal modifies an existing amendment or if a new amendment is needed. If the proposal modifies an **existing amendment**, show the modifications to the existing amendment by underlining all added language and striking through all deleted language. If a new amendment is needed, show the modifications to the **model code** by underlining all added language and striking through all deleted language.

**Code(s)** 2021 International Building Code      **Section(s)** 1615

Enforceable code language must be used.

Delete WAC 51-50 1615-Tsunami Loads in its entirety, and replace with the following:

**WAC 51-50-1615 Tsunami loads.**

**1615.1 General.** The design and construction of Risk Category III and IV buildings and structures located in the Tsunami Design Zones shall be in accordance with Chapter 6 of ASCE 7-22, except as modified by this code. Wherever ASCE 7 is referenced herein, it shall refer to ASCE 7-22, within the extent of ASCE 7 Chapter 6 and WAC 51-50-1615.

**USER NOTE:** The intent of the Washington state amendments to ASCE 7 Chapter 6 (Tsunami Loads and Effects) is to require use of the Washington Tsunami Design Zone maps to determine inundation limits, i.e., when a site is within a tsunami design zone. The Washington state department of natural resources has parameters for tsunami inundation depth and flow velocity available for all of Washington's coastal waters and tidally influenced riverine systems (WA-TDZ). These parameters are required to be used in lieu of ASCE Tsunami Design Geodatabase, and as a basis for comparison in the probabilistic tsunami hazard analysis in this chapter.

**1615.2 Modifications to ASCE 7.** The text of Chapter 6 of ASCE 7 shall be modified as indicated in this section.

**1615.2.1 ASCE 7 Section 6.1.1.** Replace the third paragraph of ASCE 7 Section 6.1.1 with the following and remove the associated Exception:

The Tsunami Design Zone shall be determined using the Washington Tsunami Design Zone maps (WA-TDZ). The WA-TDZ maps are available at <https://www.dnr.wa.gov/wa-tdz>.

**1615.2.2 ASCE 7 Section 6.1.1.** Add new fifth paragraph and user note to ASCE 7 Section 6.1.1 to read as follows:

Whenever a Tsunami Design Zone or Fig. 6.1-1 is referenced in ASCE 7 Chapter 6, the WA-TDZ maps shall be used.

**USER NOTE:** Tsunami design zone and design parameters may be obtained from the Washington state department of natural resources. See <https://www.dnr.wa.gov/wa-tdz>.

**1615.2.3 ASCE 7 Section 6.2.** Modify ASCE 7 Section 6.2 definitions to read as follows:

**ASCE TSUNAMI DESIGN GEODATABASE: Not Adopted.**

**USER NOTE:** The ASCE tsunami design geodatabase is not adopted for design purposes in Washington State.

**MAXIMUM CONSIDERED TSUNAMI:** A probabilistic tsunami having a 2% probability of being exceeded in a 50-year period or a 2,475-year mean recurrence, or a deterministic assessment considering the maximum tsunami that can reasonably be expected to affect a site.

**TSUNAMI DESIGN ZONE MAP:** The Washington Tsunami Design Zone maps (WA-TDZ) designating the potential horizontal inundation limit of the Maximum Considered Tsunami found at [www.dnr.wa.gov/wa-tdz](http://www.dnr.wa.gov/wa-tdz).

**1615.2.4 ASCE 7 Section 6.2.** Add new definitions to ASCE 7 Section 6.2

to read as follows:

**WASHINGTON TSUNAMI DESIGN ZONE MAP (WA-TDZ):** The Washington Department of Natural Resources maps of potential tsunami inundation limits for the Maximum Considered Tsunami, designated as follows:

<u>Columbia River</u>	<u>DOGAMI SP-51 (L1 scenario) adopted by WA DNR</u>
<u>Outer Coast and Strait area</u>	<u>MS 2022-01</u>
<u>Port Townsend</u>	<u>MS 2018-03 [Partially superseded by MS 2022-01]</u>
<u>Puget Sound</u>	<u>MS 2021-01 [revised 2022]</u>
<u>San Juan Islands</u>	<u>MS 2016-01 [Partially superseded on its eastern edge by MS 2021-01]</u>
<u>Southern Washington Coast</u>	<u>MS 2018-01</u>

The Washington State Department of Natural Resources geodatabase of design parameters for tsunami inundation depth, flow velocity, offshore tsunami amplitude, predominant period, and tsunami design zone maps for a maximum considered tsunami is available at the Washington TDZ website [<https://www.dnr.wa.gov/wa-tdz>].

**1615.2.5 ASCE 7 Section 6.5.1.** Add new second paragraph to ASCE 7 Section 6.5.1 to read as follows:

**6.5.1 Tsunami Risk Category II and III buildings and other structures.** The Maximum Considered Tsunami inundation depth and tsunami flow velocity characteristics at a Tsunami Risk Category II or III building or other structure shall be determined by the WA-TDZ maps. Those parameters shall be used as the Maximum Considered Tsunami inundation depth and tsunami flow velocity characteristics in lieu of the Energy Grade Line Analysis in Section 6.6.

**1615.2.6 ASCE 7 Section 6.5.1.1.** Modify the first paragraph of ASCE 7 Section 6.5.1.1 to read as follows:

**6.5.1.1 Runup evaluation for areas where no map values are given.** For Tsunami Risk Category II and III buildings and other structures where no mapped inundation limit is shown in the Tsunami Design Zone map, the ratio of tsunami runup elevation above Mean High Water Level to Offshore Tsunami Amplitude,  $R/HT$ , shall be permitted to be determined using the surf similarity parameter  $\xi_{100}$ , according to Eqs. (6.5-2a, b, c, d, or e) and Fig. 6.5-1.

**1615.2.7 ASCE 7 Section 6.5.2.** Modify the paragraph and the exception, to read as follows:

**6.5.2 Tsunami Risk Category IV buildings and other structures.** A site-specific Probabilistic Tsunami Hazard Analysis (PTHA) shall be performed for Tsunami Risk Category IV buildings and other structures. Site-specific velocities determined by site-specific PTHA determined to be less than the design flow velocities determined from the WA-TDZ maps shall be subject to the limitation in Section 6.7.6.8. Site-specific velocities determined to be greater than the WA-TDZ map velocities shall be used.

**EXCEPTIONS:**

1. For structures other than Tsunami Vertical Evacuation Refuge Structures, a site-specific Probabilistic Tsunami Hazard Analysis need not be performed where the inundation depth determined from the WA-TDZ maps is determined to be less than 12 ft (3.66 m) at any point within the location of the Tsunami Risk Category IV structure.

**1615.2.8 ASCE 7 Section 6.6.1.** Replace ASCE 7 Section 6.6.1 to read as follows:

**6.6.1 Maximum inundation depth and flow velocities.** The maximum inundation depths and flow velocities associated with the stages of tsunami flooding are determined by the WA-TDZ maps. Flow velocity for design purposes shall not be taken as less than 10 ft/s (3.0 m/s) and need not be taken as greater than the lesser of  $1.5(g_{hmax})^{1/2}$  and 50 ft/s (15.2 m/s).

**1615.2.9 ASCE 7 Section 6.7.** Replace ASCE 7 Section 6.7 with the following and add a user note:

When required by Section 6.5, the inundation depths and flow velocities shall be determined by site-specific inundation studies complying with the requirements of this section. Site-specific analyses shall use an integrated generation, propagation, and inundation model that replicates the given offshore tsunami waveform amplitude and period from the seismic sources given in Section 6.7.2.

USER NOTE: WA-TDZ maps are based on an integrated generation, propagation, and inundation model replicating waveforms from the seismic sources specific to Washington state. See <https://www.dnr.wa.gov/wa-tdz>.

**1615.2.10 ASCE 7 Table 6.7-2.** Modify ASCE 7 Table 6.7-2 to read as follows:

**Table 6.7-2**  
**Maximum Moment Magnitude**

<u>Subduction Zone</u>	<u>Moment Magnitude</u> <u>M<sub>Wmax</sub></u>
<u>Alaskan-Aleutian</u>	<u>9.2</u>
<u>Cascadia</u>	<u>9.0</u>
<u>Chile-Peru</u>	<u>9.5</u>
<u>Izu-Bonin-Mariana</u>	<u>9.0</u>
<u>Kamchatka-Kurile and Japan Trench</u>	<u>9.4</u>

**1615.2.11 ASCE 7 Section 6.7.5.1.** Modify ASCE 7 Section 6.7.5.1 Item 4, Item 5, and Item 6 to read as follows:

**6.7.5.1 Offshore tsunami amplitude for distant seismic sources.** Offshore tsunami amplitude shall be probabilistically determined in accordance with the following:

4. The extent of offshore tsunami amplitude points considered for the site shall include the following:

(a) For outer coast sites, the extent shall include points within at least 40 mi (64.4 km) but not exceeding 50 mi (80.5 km) of projected length along the coastline, centered on the site within a tolerance of plus or minus 6 mi (9.7 km);

(b) Reserved;

(c) For sites within bays or inland waterways (such as the Strait of Juan de Fuca), the designated center of the computed offshore tsunami amplitude points shall be taken offshore of the mouth of the bay or waterway centered in accordance with criteria (a) above.

(d) For island locations where the projected width of the island is less than 40 mi (64.4 km), it shall be permitted to consider the extent of offshore tsunami amplitude points corresponding to the projected width of the island. Shorter extents of offshore tsunami amplitude points shall be permitted for island locations, but shall not be less than 10 mi (16.1 km).

(e) In addition to the above, the tsunami source development and inundation modeling are subject to an independent peer review by a tsunami modeler approved by the Authority Having Jurisdiction, who shall present a written report to the Authority Having Jurisdiction as to the hazard consistency of the modeling with the requirements

of Section 6.7.

5. The mean value of the computed offshore tsunami wave amplitudes shall be not less than 100% of the mean value for the coinciding offshore tsunami amplitude data given by the WA-TDZ maps.

6. The individual values of the computed offshore tsunami wave amplitude shall be not less than 80% of the coinciding offshore tsunami amplitude values given by the WA-TDZ maps.

1615.2.12 ASCE 7 Section 6.7.5.3. Modify ASCE 7 Section 6.7.5. 3.1(b) and (c) to read as follows:

(b) The mean value of the computed offshore tsunami amplitudes is at least 85% of the mean value for the coinciding offshore tsunami amplitude data of the WA-TDZ maps.

(c) The values of the computed offshore tsunami wave amplitude are not less than 75% of the coinciding offshore tsunami amplitude values of the WA-TDZ maps.

1615.2.13 ASCE 7 Section 6.7.6.2. Modify ASCE 7 Section 6.7.6.2 and add a user note to read as follows:

6.7.6.2 Seismic subsidence before tsunami arrival. Where the seismic source is a local earthquake event, the Maximum Considered Tsunami inundation shall be determined for an overall elevation subsidence value directly computed for the seismic source mechanism.

USER NOTE: WA-TDZ maps include computed subsidence and uplift (where applicable) in the inundation results. See [https:// www.dnr.wa.gov/wa-tdz](https://www.dnr.wa.gov/wa-tdz).

1615.2.14 ASCE 7 Figure 6.7-3. Remove Figure 6.7-3 and the associated note.

1615.2.15 ASCE 7 Section 6.8.9. Modify the first sentence of ASCE 7 Section 6.8.9 to read as follows:

6.8.9 Seismic effects on the foundations preceding maximum considered tsunami. Where designated in the Tsunami Design Zone map as a site subject to a tsunami from a local earthquake, the structure shall be designed for the preceding coseismic effects.

## Chapter 35

Add the following ASCE/SEI Reference:

7-22 Minimum Design Loads and Associated Criteria for Buildings and Other Structures  
1615.1

Modify the following ASCE/SEI reference to read as follows:

7-16 with supplement 1: Minimum Design Loads and Associated Criteria for Buildings and Other Structures

202, Table 1504.2, 1602.1, Table 1604.3, 1604.5, Table 1604.5, 1604.8.2, 1604.9, 1605.1, 1605.1.1, 1605.2, 1606.3, 1607.9.1, 1607.9.1.1, 1607.9.1.2, 1607.10, 1607.14.1, 1607.17, 1608.1, 1608.2, Figure 1608.2(1), 1608.3, 1609.1.1, 1609.2, 1609.3, Figure 1609.3(5), Figure 1609.3(6), Figure 1609.3(7), Figure 1609.3(8), Figure 1609.3(9), Figure 1609.3(10), Figure 1609.3(11), Figure 1609.3(12), 1609.5.1, 1609.5.3, 1611.1, 1611.2, 1612.2, 1613.1, 1613.2.2, 1613.2.3, Table 1613.2.3(1), Table 1613.2.3(2), 1613.2.5, 1613.2.5.1, 1613.2.5.2, 1613.3, 1614.1, (~~1615.1~~), 1705.13, 1705.13.1.1, 1705.13.1.2, 1705.13.4, 1705.14.1.1, 1705.14.1.2, 1705.14.2, 1705.14.3, 1705.14.4, 1709.5, 1709.5.3.1, 1802.1, 1803.5.12, 1806.1,

1808.3, 1808.3.1, 1809.13, 1810.3.1.1, 1810.3.6.1,  
1810.3.8, 1810.3.9.2, 1810.3.9.4, 1810.3.9.4.1,  
1810.3.9.4.2, 1810.3.11.2, 1810.3.12, 1902.1, 1905.1.2,  
1905.1.7, 1905.1.8, 2205.2.1.1, 2205.2.1.2, 2205.2.2,  
2206.2.1, 2209.1, 2209.2, 2210.2, 2211.1.1.1, Table  
2304.6.1, Table 2306.3(3), Table 2308.7.5, 2404.1, 2505.1,  
2505.2, 2506.2.1

- 5. Briefly explain your proposed amendment, including the purpose, benefits and problems addressed.** Specifically note any impacts or benefits to business, and specify construction types, industries and services that would be affected. Finally, please note any potential impact on enforcement such as special reporting requirements or additional inspections required.

This code change proposal is intended to replace the related code change proposal submitted by the same designated contact person on April 7, 2022. Since that time, Washington Department of Natural Resources (WA DNR) has finalized the development of tsunami design zone maps for all coastal areas of the state. This revised proposal adopts these latest tsunami hazard maps into the state building code and brings forward the latest published tsunami design zone requirements contained in American Society of Civil Engineers Standard 7-22, which would otherwise be adopted as part of the 2024 International Building Code.

The code change proposal does very little to modify the engineering requirements contained in Chapter 6, instead the proposal focuses on adopting the WA DNR maps reflecting current understanding of tsunami risk in the state.

- 6. Specify what criteria this proposal meets.** You may select more than one.

- The amendment is needed to address a critical life/safety need.
- The amendment clarifies the intent or application of the code.
- The amendment is needed to address a specific state policy or statute.
- The amendment is needed for consistency with state or federal regulations.
- The amendment is needed to address a unique character of the state.
- The amendment corrects errors and omissions.

- 7. Is there an economic impact:**  Yes  No

If no, state reason:

This code change proposal represents an extension of the change already incorporated into the 2018 State Building Code and incorporates the latest design requirements for select structures in the tsunami inundation zone. Therefore, this proposal does not represent an economic impact relative to the current state building code.

If yes, provide economic impact, costs and benefits as noted below in items a – f.

- a. **Life Cycle Cost.** Use the OFM Life Cycle Cost [Analysis tool](#) to estimate the life cycle cost of the proposal using one or more typical examples. Reference these [Instructions](#); use these [Inputs](#). Webinars on the tool can be found [Here](#) and [Here](#)). If the tool is used, submit a copy of the excel file with your proposal submission. If preferred, you may submit an alternate life cycle cost analysis.
- b. **Construction Cost.** Provide your best estimate of the construction cost (or cost savings) of your code change proposal.

\$Click here to enter text./square foot

(For residential projects, also provide \$[Click here to enter text.](#)/ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

- c. **Code Enforcement.** List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:
  
- d. **Small Business Impact.** Describe economic impacts to small businesses:
  
- e. **Housing Affordability.** Describe economic impacts on housing affordability:
  
- f. **Other.** Describe other qualitative cost and benefits to owners, to occupants, to the public, to the environment, and to other stakeholders that have not yet been discussed:

Please send your completed proposal to: [sbcc@des.wa.gov](mailto:sbcc@des.wa.gov)

**All questions must be answered to be considered complete. Incomplete proposals will not be accepted.**